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Socio Economic and Livelihood Analysis of the People in Garhkundar-Dabar Watershed of Central India

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ABSTRACT

The studies on socio-economic, livelihood and plant species having considerable economic significance in the livelihood of people of Dabar-Garhkundar watershed are presented in this paper. The present investigation was conducted in Dabar-Garhkundar watershed of Tikamgarh, M.P. representing typical physiography and economy of Bundelkhand region. Approximately 895 people are directly dependent on the watershed and having 2648 animal resources of which 57.2 % are goat, 16.8% sheep, 11.3% buffaloes and only 4.8 % cattle. The watershed area has predominance of people belonging to other backward class (49.3%) followed by scheduled castes (28.3%), scheduled tribes (16.1%) and general category (6.4%). Marginal and small land holdings, together comprises 86.3% and rest 13.7% are medium with no large land holdings in the watershed area. The occupation structure of the watershed people shows that nearly 19.5% population derives its livelihood from agriculture including animal husbandry, while 56% people dependent on agriculture as well as labour work in and around the watershed. Nearly 21% derive their subsistence solely from labour activities. The percentage of people employed in government services is 1.2 while 2.3 per cent people were engaged in other occupations like masonry work, driving, tailoring, pot making, carpentering, etc. The communities living in watershed have immense knowledge about plant wealth and are dependent on flora for their social and livelihood needs. During the study, 22 plant species used for edible purposes; 7 plant species for extraction of gum, tannin, dyes and insecticidal properties; 6 plant species for making ropes, baskets, mats, brooms, fibers and thatching houses; 3 plant species for making country liquor; 12 plant species for fodder; 5 plant species for fencing and 8 plant species for fuel wood, timber and making agricultural implements were recorded from the watershed area.

Key words: *Socio-economic study, economic plant species, livelihood, watershed, Bundelkhand*

1. INTRODUCTION

Bundelkhand is one of the most backward regions of India as identified by planning commission. The region comprises of seven districts of U.P. and six districts of M.P. Physiographically, Bundelkhand is among the most disadvantaged regions of the country owing to undulated and rugged topography, highly eroded and dissected land, poor soil fertility and scarce underground water resources. Most of the population (>70%) derives their livelihood from agriculture which is mainly traditional and subsistence in nature. Their livelihood is further threatened by the un-favourable climatic conditions characterized by high temperatures and low and erratic rainfall. At the same time, the natural resources of the region are under immense pressure due to high animal and human population. During the last 17 years, the region has witnessed 7 years of severe drought (1990, 1994, 2002, 2004-07) leading to a heavy out migration to the extent of 48% of total population towards big cities in search of livelihood (Anonymous, 2008). The situation is more alarming particularly in last 4-5 years in the countryside of Bundelkhand. The crop failures are frequent due to low and erratic rainfall and lack of rain water harvesting techniques. There is lack of alternate livelihood opportunities and sustainable land use systems like agroforestry. Yadav (2003) while assessing the forest resources in Bundelkhand mentioned that forest play important role in the socio economic life of the people in the region. Under such circumstances, a model watershed project based on proven agroforestry interventions was initiated at Dabar-Garhkundar area of Tikamgarh, M.P. which is a true representative of Bundelkhand region. The present studies were conducted as a part of pre-implementation phase of the project involving a multidisciplinary team of scientists.

2. MATERIALS AND METHODS

The present study was conducted at Dabar-Garhkundar watershed situated near Niwari in Tikamgarh district of Madhya Pradesh in Bundelkhand region of Central India. The watershed area falls between 78°52'39" to 78°54'44" E longitude and 25° 26'23" to 25° 28'32" N latitude with an altitude varying from 230 to 280 m above mean sea level (MSL). The total area of watershed is 850 ha which ultimately drains into river Betwa. The average annual rainfall of the area is around 900 mm. However, the mean annual rainfall recorded at the nearest observatory (Jhansi) during last four years is nearly half of the

long term annual average (539.4 mm in 2004, 548.1 mm in 2005, 332.8 mm in 2006 and 341.3 mm in 2007) leading to consequent droughts. In general, May-June are the hottest while December-January are the coldest months of the year. The soils are highly denuded, dissected, sloppy and poor in fertility. The forest area is overexploited having predominance of lopped trees of Kardhai, Dhak and Semal.

The watershed area was selected based on backwardness and need for development. This area was characterized by acute shortage of water both for irrigation and drinking, large population of downtrodden people (SC, ST and OBC), preponderance of wastelands/degraded lands, significantly lower wages rates and more importantly, the virginity in terms of developmental activities particularly soil and water conservation practices and improved agro-techniques for crop production. Tikamgarh district is also identified as one of the most backward district in the country by Planning Commission, Govt. of India.

The data are collected through Participatory Rural Appraisal (PRA) and personal interactions with farmers in the watershed villages. Few information are also obtained through household surveys and confirmed with line departments of the government. The watershed area comprises of eight different villages and hamlets namely Sakuli, Dabar, Shivrampur, Garhkundar, Rautiana, Ganj, Ubaura and Shyamsi belonging to three different Gram Panchayats.

3. RESULTS AND DISCUSSION

3.1 Demography of watershed

The watershed area represents a diverse demography. The watershed has an area of 850 ha which supports nearly 190 families from eight different villages and hamlets. The total human population directly dependent on watershed and have land in the watershed is 895 of which 507 are males and 388 are females (Fig.1). Thus, the gender scenario in the watershed is very much adverse and the sex ratio (number of females/1000 male population) is worked out to be 765 which is very low as compared to our national average (933) and is in the range of states like Punjab and Haryana which have worst sex ratios in India. High maternal mortality rates, preference to male child over female child, high mortality rate in case of girl child due to negligence and poor health care services, paternal nature of society, etc. are the main factors responsible for adverse sex ratio in the watershed area.

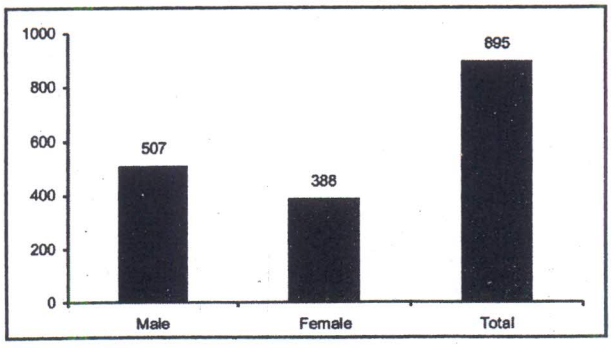

Fig. 1: Population composition in watershed.

The categorization of watershed population into different categories namely Scheduled Castes (SC), Scheduled Tribes (ST), Other Backward Classes (OBC) and General Category are illustrated in Fig. 2 which shows a predominance of downtrodden in the watershed villages. The largest population belongs to OBC category which alone constitutes 49.3% of total watershed population followed by SC (28.3%) and ST (16.1%). The general category constitutes only 6.4% of the total population. SC and ST together comprise nearly 44.4% of total population indicating the majority of deprived people in the selected watershed. SC and ST together with OBC constitute 93.6% of the total population.

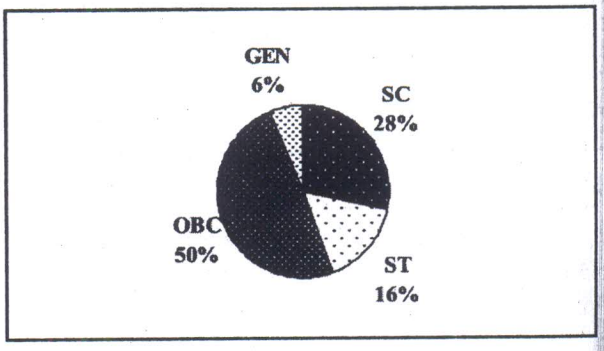

Fig. 2: Category wise per cent composition of population in watershed.

The study of age structure of the population is an important aspect where in the total population is divided into young (<18 years), adult (18-60 years) and old (>60 years) age groups. Age structure is an important demographic attribute which reflects the working or earning class and dependent class of population and thus, reflects the workforce and productivity and have a direct bearing on the economy of the area. Higher proportion of adult age group shows the abundance of work force or earning population while higher proportion of young and old age group shows the higher dependency ratio which is actually a burden on work force and resources. In present study, the proportion of young, adult and old population is 38.88, 54.97 and 6.15%, respectively, thus, the work force is 54.97% of total population while the dependent population, young and old, together constitutes 45.03% of total population leading to a dependency ratio of 0.82 (Fig.3).

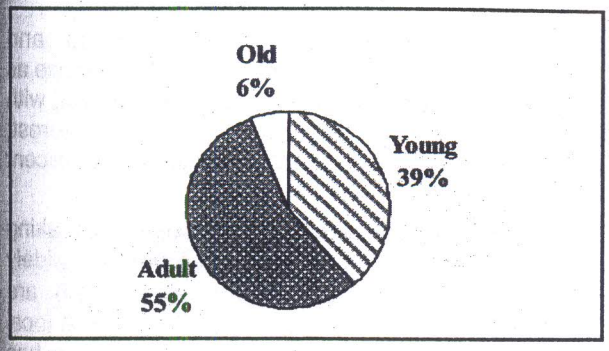

Fig. 3: Per cent age structure of population in watershed.

3.2 Livelihood analysis

At present, the people in watershed derive their livelihood from multiple sources. Agricultural activities including animal husbandry, labour, services and other activities like masonry work, tailoring, carpentering, driving, etc., are the main sources of livelihood earning. Earlier, the watershed people were highly dependent on adjoining forests for their subsistence and livelihood. However, with the passage of time and manifold increase in their population and over exploitation of squeezing forest resources, cultivation of agricultural crops and other livelihood means have been adopted. The occupation structure of the watershed people is presented in Fig.4 which shows that nearly 19.5% population derives its livelihood from agriculture including animal husbandry while 56% people depend upon agriculture as well as labour work in and around the watershed. Nearly 21% derives their subsistence solely from labour activities. The percentage of people employed in government services is 1.2. Nearly 2.3 per cent people were engaged in other occupations like masonry work, driving, tailoring, pot making, carpentering, etc. However, they also work as labour or other activities when enough work is not available to them particularly during lean periods.

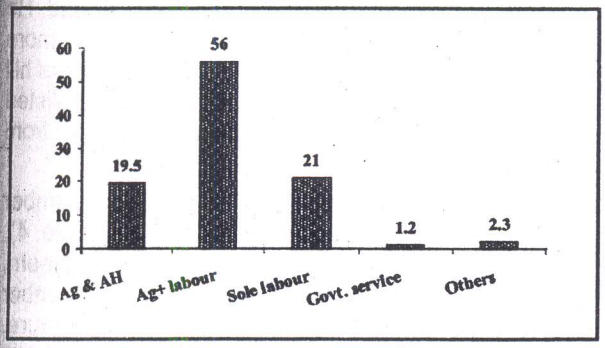

Fig. 4: Per cent occupation structure in watershed.

As far as land holding size is concerned, there is no large farmer (> 10 ha. land) in the whole watershed area. The largest proportion of land holding size comes under marginal (< 1 ha. land) category which is around 72.1% of the total land holdings followed by small (1-2 ha) and medium (2-10 ha) land holding categories (Fig.5). The marginal and small land holdings together comprises 86.3% of the total land holdings while remaining 13.7% comes under medium land holding category. Further, their land holdings are not consolidated and are scattered/fragmented here and there in the watershed area. This hinders adoption of farm machinery and other improved agro techniques.

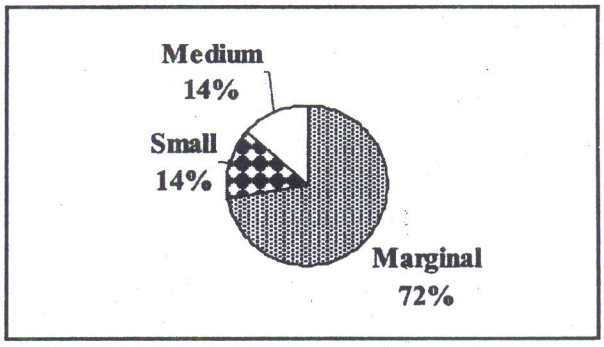

Fig. 5: Percent land holding distribution in watershed.

Livestock play an important role in the livelihood and subsistence of the people in watershed area. The total animal wealth in watershed area is around 2648 out of which 57.2% are goat followed by 16.8% sheep, 11.3% buffalo, 4.8% cattle, 3.5% bullocks and 6.4% poultry (Fig.6). The small ruminants, i.e., goat and sheep together comprise 74% of the total animal population whereas buffalo and cattle constitute 16.1% of total animal wealth. Most of the animal breeds are non-descript or Desi and have low milk productivity.

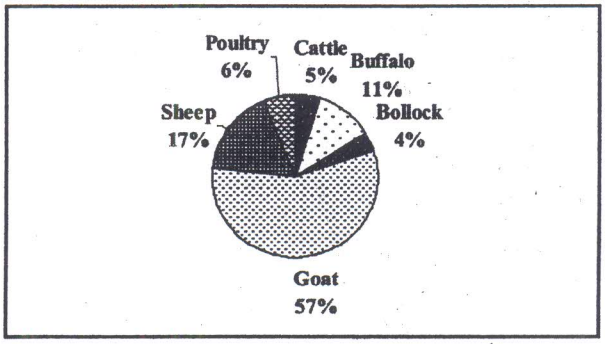

Fig. 6: Livestock wealth (%) in watershed.

The milk productivity in terms of litres/day/animal varies between 3-5 for buffaloes, 1-2 for cows and 0.250-0.500 in case of goats. Still they contribute significantly in rural livelihood security and provide a kind of drought proofing. The number of animal per household worked out to be 13.9 while the number of animal per person was 2.9. This signifies animals contribution in the rural livelihood

in terms of milk, meat, eggs, income and employment. Small ruminants like goat and sheep rearing is economically very viable and profitable.

The floral wealth is of great significance in the socio-economic life of the watershed people. Rai and Nath (2006) conducted socio-economic an livelihood studies of Baiga Tribals in Chhattishgarh and obsevered that forest alongwith cultivated crops played significant role in the socio-economic life and livelihood of the people in the area. Plant resources are the principal source of life support system in the area. Most of the population derives their livelihood from cultivated crops. The main cultivated crops are Jowar, Urd, Moong, Til, Arhar, etc., during Kharif and Wheat, Gram, Mustard, Pea, etc., during Rabi season. The main vegetables grown at small scale for domestic use and for local weekly markets are Brinjal, Tomato, Chilli, Onion, etc. Bathua is commonly consumed as green leafy vegetable which is otherwise a weed in rabi crops. The common tuber and root crops are Potato, Sweet Potato, Rataloo, and Colocasia. Ginger and Turmeric are also grown wherever adequate irrigation facilities exist (near wells). The main fruit crops are Aonla, Mango, Papaya, Desi Ber, citrus and kaith. Except Ber and Kaith other fruit crops are deliberately planted. All these tuber, root and fruit crops are grown at small scale for domestic use and surplus, if any, is sold in the local weekly markets. Boiled and roasted Mahua fruits are also consumed by the local people. Local weekly markets are the important features in the economy of the area. They are organized on different days at different locations where the local sellers and buyers assemble for buying and selling the agricultural and forest products and other essential commodities of their daily use. The plant species used for edible purposes are listed in Table 1 along with their local name, botanical description and economic utility.

Besides edible crops and plants, the local people also make use of other plant species in one or other way for earning their livelihood. Though, a sizeable proportion of watershed population does not depend solely on the other floral wealth but still they use it substantially in their livelihood by exploiting various plant species for different purposes. The various diversified uses of floral wealth are discussed below.

The plant species used for making ropes, baskets, mats, brooms, fibers and thatching houses are documented in Table 2. The people in watershed area, especially the tribal people of Rotiana are good in use of axe for cutting bamboos, twigs, wood, etc. Both male and female are expert in making Dalia/Baskets from bamboos and other plants like Khajoor, Kardhai, Lantana and Alangium. They make baskets for domestic use as well as for sale in weekly markets. However, with the degradation and overexploitation of forest, Dalia making has reduced considerably in recent past.

Bans and Khajoor leaves are also used for making brooms and mats. The leaves of Palas are widely used for making cups and plates which are commonly used at shops as well during the local ceremonies and festivals, though, their use has reduced due to the introduction of low cost plastic cups and plates.

Palas trees are also being used for extracting fibers used for rope making. Similarly, the semal pods yield quality fibre which is used in filling pillows, mattresses and making cloths. Arhar stems, Palas and Khajoor leaves are also commonly used as thatching material for houses.The floral wealth used for collection or extraction of gum, tannin and dyes and having insecticidal properties is documented in Table 3. Local people collect these minor forest products and use them for various purposes. The gum collected from Babul and Palas is used for edible purpose. It also has medicinal properties and used in case of scorpion sting. The gum collected from Kardhai has utility in paper industry and printing. The gum obtained from Neem is used as adhesive. Neem also has anti-pest properties and widely used as insect repellant particularly in grain storage and in protecting the clothes. Its leaves are kept in stored grains and also in clothes to protect them from pests. Neem twigs are also used for cleaning teeth. Saffron coloured dye is obtained from boiling the flowers of the Palas. Tannin is obtained from plants like Babul, Ber, Aonla, Kardhai and Kantali. Tannin obtained from *Argemone mexicana* has utility in leather work. Lal (2003) emphasized that non wood forest products are the main source of forest revenue as well as source of livelihood. He further mentioned that Uttranchal state has more than 65% forest cover and 90% of population of hill region depends on it for their livelihood. He listed more than 15 different products obtained from forest wealth.

A number of plants are used as fuel wood, timber and making agricultural implements (Table 4). Wood of trees like Sisham, Babul, Ber, Neem, Mahua, etc. are durable and have good timber quality and widely used for making furniture, doors and windows. In addition, their twigs have higher calorific value and used as fuelwood. Crop residues like Mustard, Til and Arhar stems are also used for fuel purpose. Kardhai and *Prosopis juliflora* wood are the main source of

Table 1. Plants used for edible purpose.

S.No.	Local Name	Generic Name	Family	Part Used	Economic Utility
1.	Pissi/Wheat	Triticum aestivum	Poaceae	Grain and straw	Grains are used in chapatti making and straw for animal feeding.
2.	Jowar	Sorghum bicolor	Poaceae	Grain and stover	Grains consumed as cereals and straw for animal feeding.
3.	Sarson (Mustard)	*Brassica juncea*	*Cruciferae*	Grain	Grain oil is used as cooking oil.
4.	Gram	*Cicer arietinum*	*Leguminosae*	Grain, Straw and leaves	Grains are used as pulses and leaves for vegetable making straw for animal feeding.
5.	Pea	*Pisum sativum*	*Leguminosae*	Grains and green pods	Green pods consumed as raw and eaten as vegetable.
6.	Urd	*Vigna mungo*	*Leguminosae*	Grains and Straw	Grains used as pulse and straw for animal feeding..
7.	Moong	*Vigna radiata*	*Leguminosae*	Grains	Grains used as pulse.
8.	Arhar	*Cajanus cajan*	*Leguminosae*	Grains	Grains used as pulse.
9.	Til	*Sesamum indicum*	*Pedaliaceae*	Grains	Grain eaten raw, vegetable oil.
10.	Potato	*Solanum tuberosum*	*Solanaceae*	Tuber	Tuber boiled and used as vegetable.
11.	Tomato	*Lycopersicum esculentum*	*Solanaceae*	Fruit	Consumed raw and as vegetable.
12.	Chilli	*Capsicum annum*	*Solanaceae*	Fruit	Consumed as vegetable and spice.
13.	Brinjal	*Solanum melongena*	*Solanaceae*	Fruit	Eaten as vegetable.
14.	Bathua	*Chenopodium album*	*Chenopodiaceae*	Leaves and twigs	Used as green vegetable and green fodder.
15.	Mango	*Mangifera indica*	*Anacardiaceae*	Fruits	As fruit and raw fruit as vegetable.
16.	Onion	*Allium cepa*	*Liliaceae*	Tuber	As vegetable.
17.	Aonla	*Emblica officinalis*	*Euphorbiaceae*	Fruit	As vegetable and Pickle.
18.	Mahua	*Madhuca latifolia*	*Sapotaceae*	Fruit	Boiled fruits used for edible purpose.
19.	Papaya	*Carica papaya*	*Caricaceae*	Fruit	Riped fruits used for consumption.
20.	Ber	*Zizyphus nummularia*	*Rhamnaceae*	Fruits	Fresh and dry ripe fruits used for eating.
21.	Yam	*Dioscorea spp.*	*Dioscoreaceae*	Tuber	Fleshy tubers are consumed after cooking.
22.	Sweet Potato	*Ipomoea batatus*	*Convolvulacae*	Roots	Fleshy roots consumed raw or after boiling.

fuelwood in the watershed area. Kardhai is known for its high calorific value and hence fuelwood costs higher in local market. Watershed area has a sizeable animal population which makes an important contribution in the livelihood of the people. During rainy season, animals graze on grasses such as Themeda, Aristida, Isleiema, Chrysopogon, Sehima, Cynodon, Dichanthium, etc. which grow naturally in the forests, along Nallahs and degraded lands. Berseem and sorghum are the important cultivated fodder crops grown. Plants like Kardhai, Vilayati babul, Babul, Ber, etc. are the important fodder trees and play important role particularly during off season. Small ruminants like sheep and goat browse these trees round the year. The common plants used as fodder source are presented in Table 5.

Country liquor is very important in the area and even used during social ceremonies and

Table 2. Plant species used for making ropes, baskets, mats, brooms, fibers and thatching houses.

S.No.	Local name	Generic name	Family	Part used	Economic uses
1.	Bans	*Dendrocalamus strictus*	*Poaceae*	Stem (canes) and leaves	Stems used for making house as building material, preparing mats, brooms and baskets.
2.	Khajoor	*Phoenix sylvestris*	*Arecaceae*	Leaves	Leaves used for making baske mats and hand fan.
3.	Palas	*Butea monosperma*	*Fabaceae*	Stem, leaves and branches	Leaves used for making cup a plates and roots are used for extracting fibre.
4.	Kardhai	*Anogeissus pendula*	*Combretaceae*	Twigs	Making baskets
5.	Arhar	*Cajanus cajan*	*Leguminoseae*	Stem	Stem is used as thatching material for houses
6.	Semal	*Bombax ceiba*		Pods	Pods yield quality fibre used fo pillows, cloths, etc.

Table 3. Plant species used for collection or extraction of gum, tannin, dyes and insecticidal properties.

S.No.	Local name	Generic name	Family	Part used	Economic uses
1.	Palas	*Butea monosperma*	*Fabaceae*	Stem and branches	Gum is collected from stem and branches by making incisions. Saffron coloured dye obtained from boiling flowers.
2.	Babul	*Acacia nilotica*	*Leguminsoseae*	Bark, roots and stem	Tannin and dye are obtained from bark and roots and gum is obtained from stem.
3.	Neem	*Azadirachta indica*	*Meliaceae*	Leaves, seeds	Seeds and leaves have insect repellant and anti- pest properties. Gum is used as adhesive, twigs as Datoon.
4.	Ber	*Zizyphus nummularia*	*Rhamnaceae*	Roots and bark	Tannin is obtained from bark and roots.
5.	Kantali	*Argemone mexicana*		Seeds and stem	Used for tannin extraction which are used in leather industry.
6.	Kardhai	*Anogeissus pendula*	*Combretaceae*	Bark, leaves and shoot	The gum is produced which is used in paper industry and calico printing. Leaves and shoot have > 30% tannin.
7.	Aonla	*Emblica officinalis*	*Euphorbiaceae*	Twigs and fruits	Fruits contain > 25% tannin while twigs have > 15% tannin.

festivals, though making and selling country liquor is illegal. The plants used for making country liquor are mentioned in Table 6. Flowers of Mahua, Khajoor sap and root bark of Ber are used to make country liquor.

Anna pratha is common in the watershed area where people leave their animals free for grazing. Similarly, there is also a threat to the crops from stray and wild animals like Neel Gai (Blue bull). The plants species used for making fences to protect their crops are documented in the Table 7. The twigs of Kardhai, Khajoor, Babul, Vilayati babul, Ber etc. are used to make bio-fences to save crops.

Table 4. Plant species used as fuel wood, timber and for making agricultural implements.

S.No.	Local name	Generic name	Family	Part used	Economic uses
1.	Shisham	*Dalbergia sissoo*	*Leguminoseae*	Boles, branches	Excellent wood for making furniture, poles, doors, windows, etc.
2.	Babul	*Acacia nilotica*	*Leguminoseae*	Boles, branches	Excellent wood for making furniture, poles, doors, windows, etc.
3.	Semal	*Bombax ceiba*	*Leguminoseae*	Boles, branches	Timber and fuel wood.
4.	Palas	*Butea monosperma*	*Fabaceae*	Boles, branches	Timber and fuel wood.
5.	Mustard	*Brassica juncea*	*Crucifereae*	Crop residue	Crop residues are used as fuel.
6.	Arhar	*Cajanus cajan*	*Leguminoseae*	Crop residue	Crop residues are used as fuel.
7.	Kardhai	*Anogeissus pendula*	*Combretaceae*	Stem, twigs	Excellent fuel wood and timber.
8.	Vilayati babul	*Prosopis juliflora*	*Leguminoseae*	Stem and branches	Excellent fuel wood.

Table 5. Plant species used for fodder.

S.No.	Local name	Generic name	Family	Part used	Economic uses
1.	Kardhai	*Anogeissus latifolia*	*Combretaceae*	Foliage	The green foliage is used as fodder for sheep and goat.
2.	Vilayati babul	*Prosopis juliflora*	*Leguminoseae*	Foliage	The green foliage is used as animal fodder.
3.	Babul	*Acacia nilotica*	*Leguminoseae*	Foliage	The green foliage is used as animal fodder.
4.	Ber	*Zizyphus nummularia*	*Rhamnaceae*	Foliage	Green fodder has medicinal value and help the animal during dioerrhoea.
5.	Doob	*Cynodon dactylon*	*Poaceae*	Foliage	Grazed by animals especially sheep, goat and cattle.
6.	Kans	*Saccharum spontaneum*	*Poaceae*	Foliage	Grazed by animals especially sheep, goat and cattle.
7.	Guner	*Themeda quadrivalvis*	*Poaceae*	Foliage	Grazed by animals especially sheep, goat and cattle.
8.	Sain	*Sehima nervosum*	*Poaceae*	Foliage	Grazed by animals especially sheep, goat and cattle.
9.	Kail	*Dichanthium annulatum*	*Poaceae*	Foliage	Grazed by animals especially sheep, goat and cattle.
10.	Musel/Machhori	*Iseilema laxum*	*Poaceae*	Foliage	Grazed by animals especially sheep, goat and cattle.
11.	Sorghum	*Sorghum bicolor*	*Poaceae*	Foliage	Cultivated fodder.
12.	Berseem	*Trifolium alexandrium*	*Leguminoseae*	Foliage	Cultivated fodder.

Table 6. Plant species used for making country liquor.

S.No.	Local name	Generic name	Family	Part used	Economic uses
1.	Mahua	*Madhuca latifolia*	*Sapotaceae*	Corolla (Flower)	Country liquor is obtained using Corolla.
2.	Khajoor	*Phoenix sylvestris*	*Arecaceae*	Sap from tender top	Sap is used for making country liquor.
3.	Ber	*Zizyphus nummularia*	*Rhamnaceae*	Root bark	Country liquor is extracted from bark of the roots.

Table 7. Plant species used for fencing.

S.No.	Local name	Generic name	Family	Part used	Economic uses
1.	Kardhai	Anogeissus pendula	Combretaceae	Twigs	Twigs and branches are used to make fenc around the field to protect the crop from str animals.
2.	Khajoor	Phoenix sylvestris	Arecaceae	Leaves	
3.	Babul	Acacia nilotica	Leguminoseae	Twigs	
4.	Vilayati babul	Prosopis juliflora	Leguminoseae	Twigs	
5.	Ber	Zizyphus nummularia	Rhamnaceae	Twigs	

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